WHAT IS CLAIMED IS:

1. An object encoding method comprising:

obtaining a description of a surface of an object;

defining an origin on the surface;

decomposing the surface into a plurality of independent shape components according to a distance from the origin to a point of the surface; and

encoding the shape components.

2. The method of claim 1, wherein the description takes a form of a polygon mesh, the origin is a predefined base vertex in the polygon mesh, and the distance is a graph distance from the base vertex to a vertex of the polygon mesh.

3. The method of claim 2, wherein shape components include a contour graph which is a set of edges that connect between vertices that have the same graph distance.

4. The method of claim 3, further comprising ensuring that the object has validity as a closed surface by applying an Euler equation to a contour node and a contour edge which are extracted from the contour graph.

5. The method of claim 2, wherein the base vertex is a plurality of base vertices and the graph distance of a specific vertex is defined as a minimum value of the graph distances from the plurality of base vertices to the specific vertex.

6. The method of claim 2, wherein the shape components include an annulus.

7. The method of claim 2, wherein the shape components include a two-dimensional cell.

8. The method of claim 6, wherein the annulus takes the form of a triangle strip.

9. The method of claim 7, wherein the two-dimensional cell takes the form of a triangle strip.

10. The method of claim 9, wherein the two-dimensional cell is an independent region, only one boundary of which connects between vertices with a graph distance m, where m is a natural number.

11. The method of claim 8, wherein the annulus is an

independent region, one boundary of which connects between vertices with a graph distance m and another boundary of which connects between vertices with a graph distance m+1, where m is a natural number.

12. The method of claim 2, wherein shape components include global topological information of the object.

13. The method of claim 12, wherein the global topological information is specified by a structural graph obtained on a basis of the graph distance.

14. The method of claim 13, wherein the structural graph is a Reeb graph known in differential topology.

15. The method of claim 2, wherein said encoding the shape components includes encoding geometrical information of the object and encoding local topological information of the object.

16. The method of claim 15, wherein said encoding the local topological information includes a description indicating that the object is a non-manifold when a shape represented by the polygon mesh is a non-manifold.

17. The method of claim 16, wherein the description describes the number of sets of polygons around a vertex that characterizes the non-manifold.

18. The method of claim 15, wherein said encoding the geometrical information adapts to a local size of the polygon mesh.

19. The method of claim 15, wherein said encoding the geometrical information is performed through an entropy coding of a difference between a predicted value and a real value of the geometrical information to be encoded.

20. The method of claim 19, further comprising adjusting the difference to optimize the entropy coding.

21. The method of claim 20, wherein the adjusting includes:

assigning an allowance range to the real value;

detecting a reference value within the allowance range to minimize an amount of the encoded difference between the predicted value and the reference value; and

replacing the difference between the predicted value and the real value by the difference between the predicted value

and the reference value.

22. The method of claim 21, wherein the allowance range is defined by adapting to the size of the polygon mesh relating to the geometrical information to be encoded.

23. An object encoding apparatus comprising:

a unit which obtains a description of a surface of an object;

a unit which defines an origin on the surface;

a unit which decomposes the surface into a plurality of independent shape components according to a distance from the origin to a point of the surface; and

a unit which encodes the shape components.

24. The apparatus of claim 23, wherein the description takes a form of a polygon mesh, the origin is a predefined base vertex in the polygon mesh, and the distance is a graph distance from the base vertex to a vertex of the polygon mesh.

25. The apparatus of claim 23, wherein shape components include global topological information of the object.

26. The apparatus of claim 23, wherein the unit which encodes

the shape components includes a unit that encodes geometrical information of the object and a unit that encodes local topological information of the object.

27. An object encoding method comprising:

obtaining an object;

defining a function on a distance on a surface of the object;

obtaining a structural graph of the object on a basis of a value of the function; and

encoding the object in such a form that the structural graph is included.

28. The method of claim 27, wherein the object is represented as a polygon mesh and the function outputs a graph distance from a predefined base vertex in the polygon mesh to a vertex of the polygon mesh.

29. The method of claim 27, wherein the structural graph represents a critical point of the function as a node.

30. An object encoding method comprising the steps of:

obtaining a description of a surface of an object;

defining an origin on the surface;

decomposing the surface into a plurality of independent shape components according to a distance from the origin to a point of the surface; and

encoding the shape components.

31. An object encoding method comprising the steps of:

obtaining an object;

defining a function on a distance on a surface of the object;

obtaining a structural graph of the object on a basis of a value of the function; and

encoding the object in such a form that the structural graph is included.

32. An object decoding apparatus comprising:

an obtaining unit which obtains encoded data of an object;

an extracting unit which extracts a plurality of independent shape components from the encoded data, wherein said plurality of independent shape components were encoded after being decomposed according to a distance from an origin of the surface, which is included in the encoded data, to a point of the surface of the object;

a decoding unit which decodes each of the extracted

shape components and reconstructs geometry and topology information of the object; and

an output unit which outputs a decoded representation of the object.

33. An object decoding method comprising:

obtaining encoded data of an object;

extracting a plurality of independent shape components from the encoded data, wherein said plurality of independent shape components were encoded after being decomposed according to a distance from an origin of the surface, which is included in the encoded data, to a point of the surface of the object;

decoding each of the extracted shape components;

reconstructing geometry and topology information of the object; and

outputing a decoded representation of the object.